Panasonic®

PROGRAMMABLE CONTROLLER

FP7 Digital Input/Output Unit

User's Manual

Phone: 800.894.0412 - Fax: 888.723.4773 - Web: www.ctiautomation.net - Email: info@ctiautomation.net

Safety Precautions

Observe the following notices to ensure personal safety or to prevent accidents.
To ensure that you use this product correctly, read this User's Manual thoroughly before use.
Make sure that you fully understand the product and information on safety.
This manual uses two safety flags to indicate different levels of danger.

WARNING

If critical situations that could lead to user's death or serious injury is assumed by mishandling of the product.

-Always take precautions to ensure the overall safety of your system, so that the whole system remains safe in the event of failure of this product or other external factor.
-Do not use this product in areas with inflammable gas. It could lead to an explosion.
-Exposing this product to excessive heat or open flames could cause damage to the lithium battery or other electronic parts.

CAUTION

If critical situations that could lead to user's injury or only property damage is assumed by mishandling of the product.

-To prevent excessive exothermic heat or smoke generation, use this product at the values less than the maximum of the characteristics and performance that are assured in these specifications.
-Do not dismantle or remodel the product. It could cause excessive exothermic heat or smoke generation.
-Do not touch the terminal while turning on electricity. It could lead to an electric shock.
-Use the external devices to function the emergency stop and interlock circuit.
-Connect the wires or connectors securely.
The loose connection could cause excessive exothermic heat or smoke generation.
-Do not allow foreign matters such as liquid, flammable materials, metals to go into the inside of the product. It could cause excessive exothermic heat or smoke generation.
-Do not undertake construction (such as connection and disconnection) while the power supply is on. It could lead to an electric shock.

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Introduction

Thank you for buying a Panasonic product. Before you use the product, please carefully read the installation instructions and the users manual, and understand their contents in detail to use the product properly.

Types of Manual

- There are different types of users manual for the FP7 series, as listed below. Please refer to a relevant manual for the unit and purpose of your use.
- The manuals can be downloaded on our website.

Unit name or purpose of use	Manual name	Manual code
FP7 Power Supply Unit	FP7 CPU Unit Users Manual (Hardware)	WUME-FP7CPUH
FP7 CPU Unit		
	FP7 CPU Unit Programming Manual	WUME-FP7CPUPGR
Instructions for Built-in COM Port FP7 Extension (Communication) Cassette	FP7 CPU Unit Users Manual (COM Port Communication)	WUME- FP7COM
Instructions for Built-in LAN Port	FP7 CPU Unit Users Manual (LAN Port Communication)	WUME-FP7LAN
FP7 Digital Input/Output Unit	FP7 Digital Input/Output Unit Users Manual	WUME-FP7DIO
FP7 Analog Input Unit	FP7 Analog Input Unit Users Manual	WUME-FP7AIH
FP7 Analog Output Unit	FP7 Analog Output Unit Users Manual	WUME-FP7AOH
FP7 High-speed Counter unit	FP7 High-speed Counter Unit Users Manual	WUMJ-FP7HSC
FP7 Positioning Unit	FP7 Positioning Unit Users Manual	WUME-FP7POSP
PHLS System	PHLS System Users Manual	WUME-PHLS
Programming Software FPWIN GR7	FPWIN GR7 Introduction Guidance	WUME-FPWINGR7

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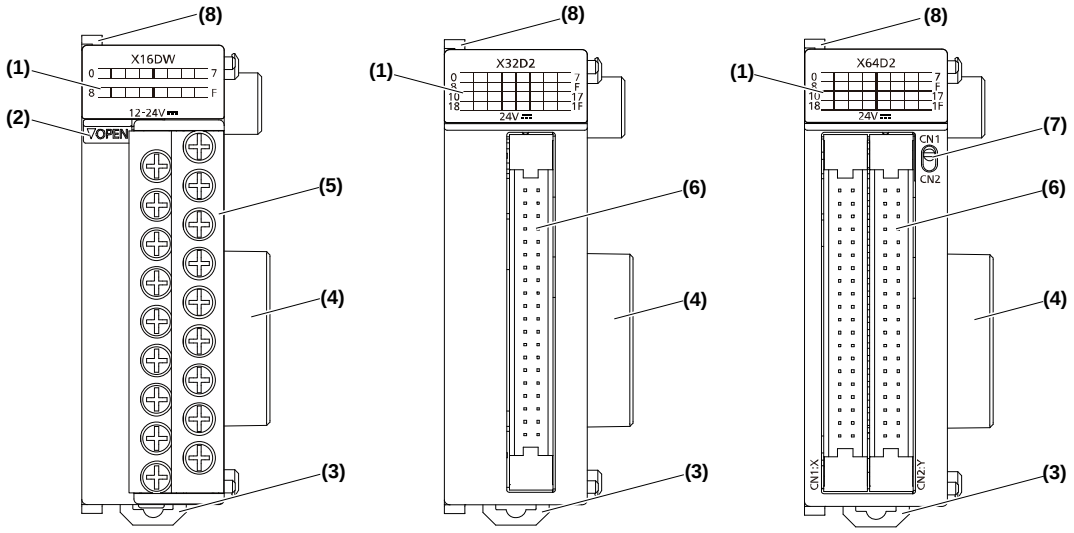
1

Unit Common Specifications

1.1 Names and Functions of Parts



(1) I/O indicator LEDs

Indicates the ON/OFF status of the input and output.

(2) Terminal block release lever

Lowering this lever makes it possible to dismount the terminal block from the unit without disconnecting the wiring. Push the lock button on the bottom of the unit to lock the release leaver after the terminal block is installed.

(3) DIN hook

This hook is used to mount the unit onto the DIN rail.

(4) Unit Connector

This connector is used to connect the internal circuits of two or more units.

(5) Terminal block

Connect power supplies for the purpose of operating and driving I/O circuits. Crimp terminals for M3 can be used.

(6) Connector (40P)

Connect power supplies for the purpose of operating and driving I/O circuits. Connectors for wire-pressed terminal cable or flat cable connectors can be used.

(7) Indicator selection switch

Use this switch to select the 32 points in the first half or the 32 points in the second half to be displayed by the I/O indicator LEDs.

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(8) Fixing hook

This hook is used to fix two or more units.

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1.2 Unit Type

■ **Input unit**

Type	Points	Connection method	Description
DC input	16 points	Terminal block	12 to 24 V DC (Common polarities + & - common) Response time switchable
	32 points	Connector	24 V DC (Common polarities + & - common) Response time switchable
	64 points	Connector	24 V DC (Common polarities + & - common) Response time switchable

■ **Output unit**

Type	Points	Connection method	Description
Relay output	16 points	Terminal block	Load current 2 A/1 point and 5 A/1 common 16 points/1 common (with no relay sockets)
Transistor output sink type	16 points	Terminal block	Load current 1 A/1 point and 5 A/1 common 16 points/1 common
	32 points	Connector	Load current 0.3 A/1 point and 3.2 A/1 common 32 points/1 common
	64 points	Connector	Load current 0.3 A (8 points: Y0-Y7) and 0.1 A (56 points: Y8-Y3F) 3.2 A/1 common and 32 points/1 common
Transistor output source type	16 points	Terminal block	Load current 1 A/1 point and 5 A/1 common 16 points/1 common
	32 points	Connector	Load current 0.3 A/1 point and 3.2 A/1 common 32 points/1 common
	64 points	Connector	Load current 0.3 A (8 points: Y0-Y7), 0.1 A (56 points: Y8-Y3F) 3.2 A/1 common, 32 points/1 common

■ **I/O mixed unit**

Type	Points	Connection method	Description
DC input/ Transistor output sink type	Input: 32 points output: 32 points	Connector	• Input specifications 24 V DC (Common polarities + & - common) Response time switchable • Output specifications Load current 0.3 A (8 points: Y0-Y7) and 0.1 A (24 points: Y8-Y1F) 3.2 A/1 common and 32 points/1 common
DC input/ Transistor output source type	Input: 32 points output: 32 points	Connector	• Input specifications 24 V DC (Common polarities + & - common) Response time switchable • Output specifications Load current 0.3 A (8 points: Y0-Y7) and 0.1 A (24 points: Y8-Y1F) 3.2 A/1 common and 32 points/1 common

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2
Specifications

2.1 General Specifications

2.1.1 Common Specifications

■ **Description**

Items	Description
Ambient temperature	0°C to +55°C
Storage temperature	-40°C to +70°C
Ambient humidity	10% to 95% (RH) with no condensation (at +25°C)
Storage humidity	10% to 95% (RH) with no condensation (at +25°C)
Breakdown voltage	<DC input and transistor output> 500 V AC for 1 min. (see note 1) ● Between input terminals and output terminals ● Between output terminals and output terminals (between different common terminals) ● Between input terminals and CPU unit power supply terminals/function earth terminals ● Between output terminals and CPU unit power supply terminals/function earth terminals <Relay output> 2300 V AC for 1 min. (see note 1) ● Between output terminals and output terminals (between different common terminals) ● Between output terminals and CPU unit power supply terminals/function earth terminals
Insulation resistance (Test voltage: 500 V DC)	<DC input and transistor output> 100MΩ or more ● Between input terminals and output terminals ● Between output terminals and output terminals (between different common terminals) ● Between input terminals and CPU unit power supply terminals/function earth terminals ● Between output terminals and CPU unit power supply terminals/function earth terminals <Relay output> 100MΩ or more ● Between output terminals and output terminals (between different common terminals) ● Between output terminals and CPU unit power supply terminals/function earth terminals
Vibration resistance	Conforming to JIS B 3502 and IEC 61131-2 5 to 8.4 Hz, 3.5-mm-wide single amplitude 8.4 to 150 Hz, acceleration 9.8 m/s^2 10-minute sweeping in X, Y, and Z directions (1 octave/min.)
Shock resistance	Conforming to JIS B 3502 and IEC 61131-2 147 m/s^2 or more, 3 times each in X, Y, and Z directions
Noise resistance	<DC input and transistor output> 1,000 V p-p, pulse widths: 50 ns and 1 μs <Relay output> 1,500 V p-p, pulse width: 50 ns and 1 μs
Environment	Free from corrosive gases and excessive dust.
EU Directive applicable standard	EMC Directive: EN 61131-2; Low-voltage Directive: EN 61131-2
Overvoltage category	Category II
Pollution level	Pollution level 2

Note 1) Cutoff current: 5 mA (Factory default setting)

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2.1.2 Current Consumption

Product name		Model number	Internal current consumption (24 V DC)
DC input unit	16 points	AFP7X16DW	25 mA or less
	32 points	AFP7X32D2	30 mA or less
	64 points	AFP7X64D2	35 mA or less
16-point-type relay output unit		AFP7Y16R	180 mA or less
Transistor output unit (sink type)	16 points	AFP7Y16T	35 mA or less
	32 points	AFP7Y32T	50 mA or less
	64 points	AFP7Y64T	75 mA or less
Transistor output unit (source type)	16 points	AFP7Y16P	35 mA or less
	32 points	AFP7Y32P	50 mA or less
	64 points	AFP7Y64P	75 mA or less
I/O Mixed Unit 32-point DC input 32-point transistor output (sink type)		AFP7XY64D2T	55 mA or less
I/O Mixed Unit 32-point DC input 32-point transistor output (source type)		AFP7XY64D2P	55 mA or less

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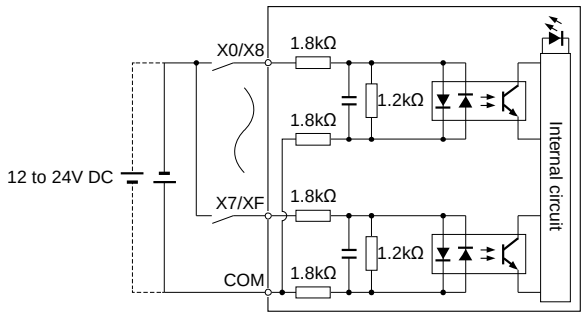
2.2 Input Unit Specifications

2.2.1 16-point-type DC Input Unit

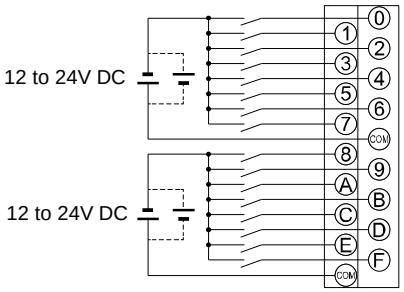
■ **Description**

Items		AFP7X16DW
Insulation system		Optical coupler
Rated input voltage		12 to 24 V DC
Rated input current		Approx. 6 mA (at 24 V DC)
Input impedance		Approx. 3.6kΩ
Operating voltage range		10.2 to 26.4 V DC
Minimum ON voltage/Minimum ON current		9.6 V/2 mA
Maximum OFF voltage/Maximum OFF current		2.5 V/1 mA
Response time	OFF→ON	0.1 ms or less (changeable with time constant switching function at time of input)
	ON→OFF	0.2 ms or less (changeable with time constant switching function at time of input)
Input points per common		8 points/1 common
Operating mode indicator		16-point LED indicator (lit in ON state)
External connection method		Terminal block connections (M3 terminal screws)
Weight (unit)		Approx. 125 g

■ **Internal circuit diagram**



■ **Terminal layout**

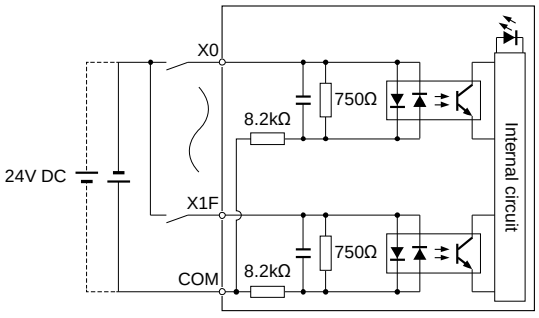


2.2.2 32-point-type DC Input Unit

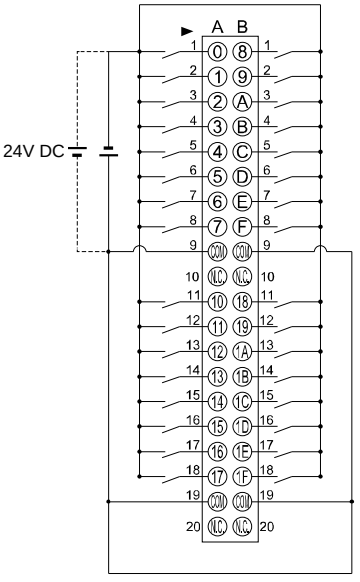
■ Description

Items		AFP7X32D2
Insulation system		Optical coupler
Rated input voltage		24 V DC
Rated input current		Approx. 2.7 mA (at 24 V DC)
Input impedance		Approx. 8.2kΩ
Operating voltage range		20.4 to 26.4 V DC
Min. ON voltage/Min. ON current		19.2 V/2.5 mA
Max. OFF voltage/Max. OFF current		5 V/1.5 mA
Response time	OFF→ON	0.2 ms max. (changeable with constant switching function at time of input)
	ON→OFF	0.2 ms max. (changeable with constant switching function at time of input)
Input points per common		32 points/1 common
Operating mode indicator		32-point LED indicator (lit in ON state)
External connection method		Connector connections (40P conforming to MIL standards)
Weight (unit)		Approx. 95 g

■ Internal circuit diagram



■ Terminal layout



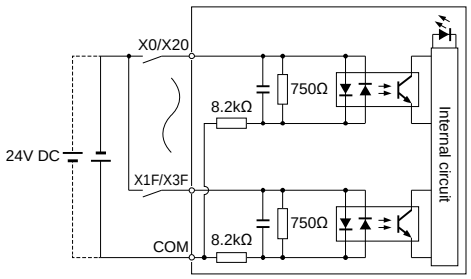
The COM terminals are connected internally.

2.2.3 64-point-type DC Input Unit

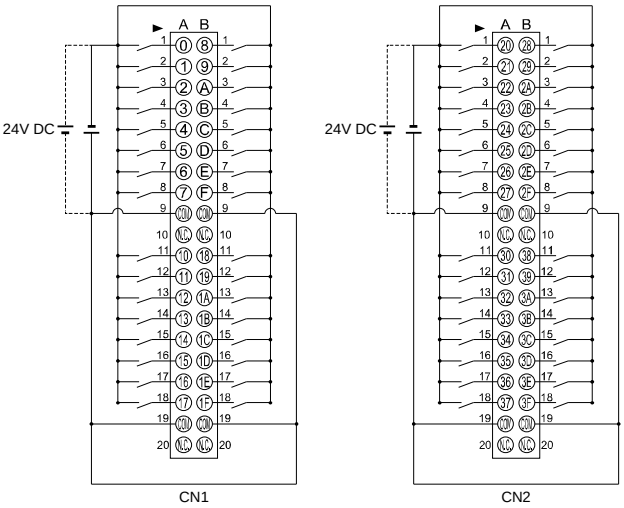
■ Description

Items		AFP7X64D2
Insulation system		Optical coupler
Rated input voltage		24 V DC
Rated input current		Approx. 2.7 mA (at 24 V DC)
Input impedance		Approx. 8.2kΩ
Operating voltage range		20.4 to 26.4 V DC
Min. ON voltage/Min. ON current		19.2 V/2.5 mA
Max. OFF voltage/Max. OFF current		5 V/1.5 mA
Response time	OFF→ON	0.2 ms max. (changeable with constant switching function at time of input)
	ON→OFF	0.2 ms max. (changeable with constant switching function at time of input)
Input points per common		32 points/1 common
Operating mode indicator		32-point LED indicator (lit in ON state)
External connection method		Connector connections (40P conforming to MIL standards)
Weight (unit)		Approx. 110 g

■ Internal circuit diagram



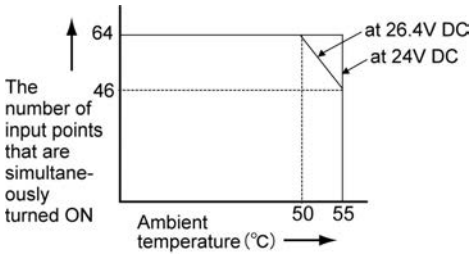
■ Terminal layout



The COM terminals in the same connector are connected internally.

■ Limits on number of simultaneously ON points

Refer to the following figure and reduce the number of input points that are simultaneously turned ON.



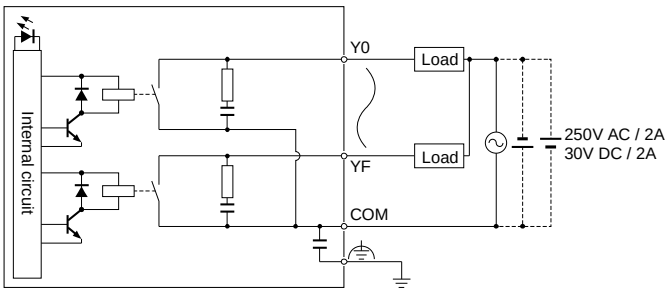
2.3 Output Unit Specifications

2.3.1 16-point-type Relay Output Unit

■ Description

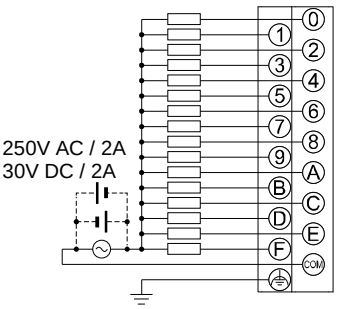
Items		AFP7Y16R
Insulation system		Relay insulation
Rated control capacity		2 A 250 V AC (5 A/common) and 2 A 30 V DC (5 A/common)
Minimum load		1 mA 100 mV (resistive load)
Response time	OFF→ON	Approx. 10 ms
	ON→OFF	Approx. 8 ms
Life	Mechanical lifetime	20 million times or more (Frequency of switching: 180 times/min.)
	Electrical lifetime	100,000 times or more (Frequency of switching: 20 times/min.)
Surge absorber		Snubber circuit (Leakage current: 0.2 mA or less)
Relay sockets		None
Input points per common		16 points/common
Operating mode indicator		16-point LED indicator (lit in ON state)
External connection method		Terminal block connections (M3 terminal screws)
Weight (unit)		Approx. 180 g

■ Internal circuit Diagram



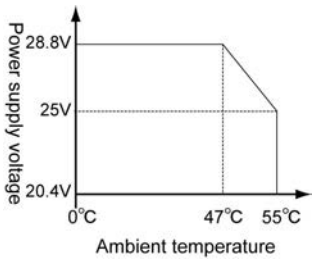
In order to avoid the effects of noise, be sure to ground the function earth terminal.

■ Terminal layout



■ Restriction on power supply voltage

Refer to the following figure and reduce the supply voltage according to the ambient temperature.

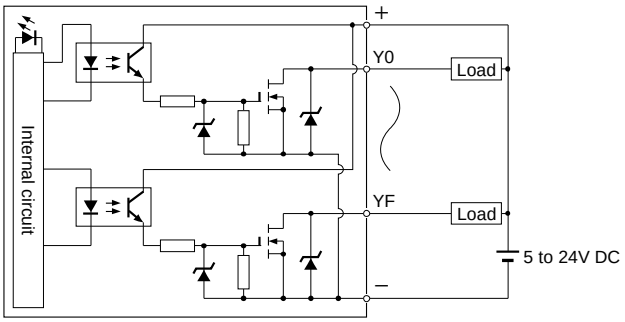


2.3.2 16-point Sink-type Transistor Output Unit

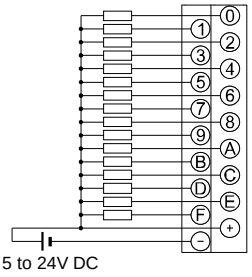
■ Description

Items		AFP7Y16T
Insulation system		Optical coupler
Output type		Open collector
Rated load voltage		5 to 24 V DC
Allowable load voltage range		4.75 to 26.4 V DC
Max. load current		1 A
Common limits		5 A/common
Max. inrush current		3 A
OFF state leakage current		1 μA max.
ON state max. voltage drop		0.5 V or less
Response time	OFF→ON	0.05 ms or less (Load current: 0.5 mA or more)
	ON→OFF	0.3 ms or less (Load current: 0.5 mA or more)
External power supply	Voltage	4.75 to 26.4 V DC
	Current	70 mA (at 24 V)
Surge absorber		Zener diode
Short-circuit protection		None
Input points per common		16 points/common
Operating mode indicator		16-point LED indicator (lit in ON state)
External connection method		Terminal block connections (M3 terminal screws)
Weight (unit)		Approx. 125 g

■ Internal circuit diagram



■ Terminal layout

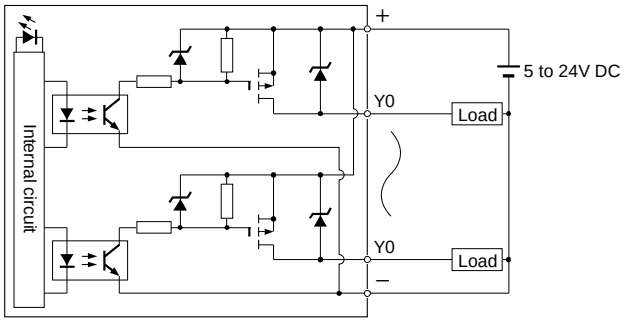


2.3.3 16-point Source-type Transistor Output Unit

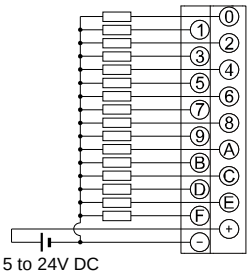
■ Description

Items		AFP7Y16P
Insulation system		Optical coupler
Output type		Open collector
Rated load voltage		5 to 24 V DC
Allowable load voltage range		4.75 to 26.4 V DC
Max. load current		1 A
Common limits		5 A/common
Max. inrush current		3 A
OFF state leakage current		1 μA or less
ON state max. voltage drop		0.5 V or less
Response time	OFF→ON	0.05 ms or less (Load current: 0.5 mA or more)
	ON→OFF	0.3 ms or less (Load current: 0.5 mA or more)
External power supply	Voltage	4.75 to 26.4 V DC
	Current	70 mA (at 24 V)
Surge absorber		Zener diode
Short-circuit protection		None
Input points per common		16 points/common
Operating mode indicator		16-point LED indicator (lit in ON state)
External connection method		Terminal block connections (M3 terminal screws)
Weight (unit)		Approx. 125 g

■ Internal circuit diagram



■ Terminal layout



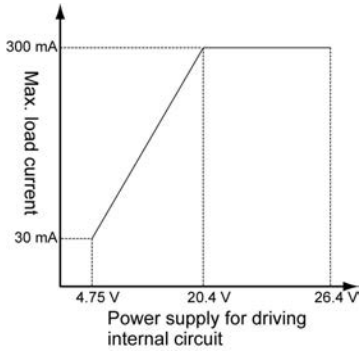
2.3.4 32-point Sink-type Transistor Output Unit

■ Description

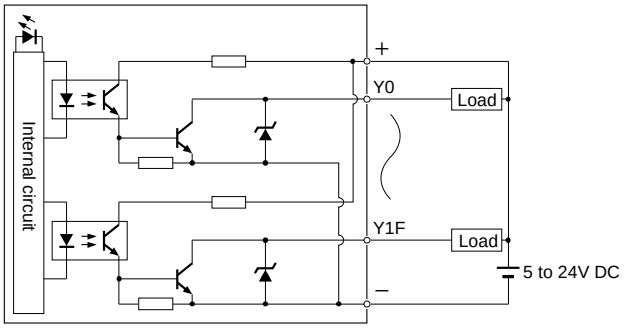
Items		AFP7Y32T
Insulation system		Optical coupler
Output type		Open collector
Rated load voltage		5 to 24 V DC
Allowable load voltage range		4.75 to 26.4 V DC
Max. load current		0.3 A (20.4 to 26.4 V DC) and 30 mA (4.75 V DC)
Common limits		3.2 A/common
Max. inrush current		0.6 A
OFF state leakage current		1 μA or less
ON state max. voltage drop		0.5 V or less
Response time	OFF→ON	0.1 ms or less (Load current: 1 mA or more)
	ON→OFF	0.3 ms or less (Load current: 1 mA or more)
External power supply	Voltage	4.75 to 26.4 V DC
	Current	110 mA (at 24 V)
Surge absorber		Zener diode
Short-circuit protection		None
Input points per common		32 points/1 common
Operating mode indicator		32-point LED indicator (lit in ON state)
External connection method		Connector connections (40P conforming to MIL standards)
Weight (unit)		Approx. 95 g

■ Restriction on load current

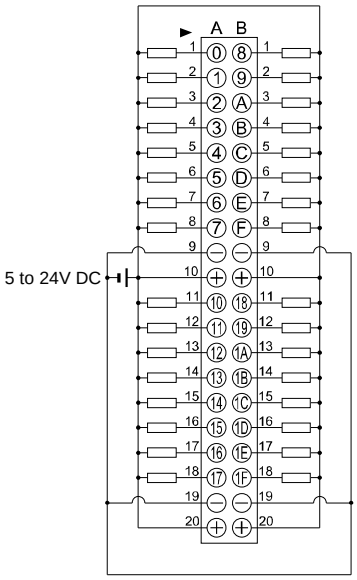
Refer to the following figure and reduce the load current according to the external power supply voltage.



■ Internal circuit diagram



■ Terminal layout



Although the positive and negative terminals are connected internally, connect these terminals externally as well.

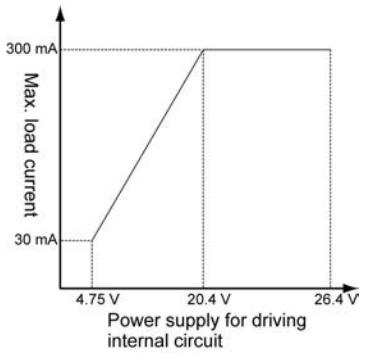
2.3.5 32-point Source-type Transistor Output Unit

■ Description

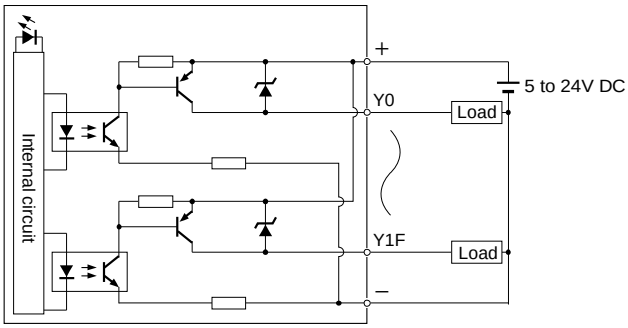
Items		AFP7Y32P
Insulation system		Optical coupler
Output type		Open collector
Rated load voltage		5 to 24 V DC
Allowable load voltage range		4.75 to 26.4 V DC
Max. load current		0.3 A (26.4 to 20.4 V DC) and 30 mA (4.75 V DC)
Common limits		3.2 A／common
Max. inrush current		0.6 A
OFF state leakage current		1 μA or less
ON state max. voltage drop		0.5 V or less
Response time	OFF→ON	0.1 ms or less (Load current: 2 mA or more)
	ON→OFF	0.5 ms or less (Load current: 2 mA or more)
External power supply	Voltage	4.75 to 26.4 V DC
	Current	130 mA (at 24 V)
Surge absorber		Zener diode
Short-circuit protection		None
Input points per common		32 points/1 common
Operating mode indicator		32-point LED indicator (Lit in ON state)
External connection method		Connector connections (40P, conforming to MIL standards)
Weight (unit)		Approx. 95 g

■ Restriction on load current

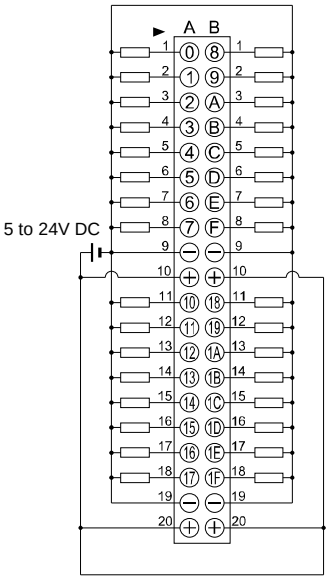
Refer to the following figure and reduce the load current according to the external power supply voltage.



■ Internal circuit diagram



■ Terminal layout



Although the positive and negative terminals are connected internally, connect these terminals externally as well.

2.3.6 64-point Sink-type Transistor Output Unit

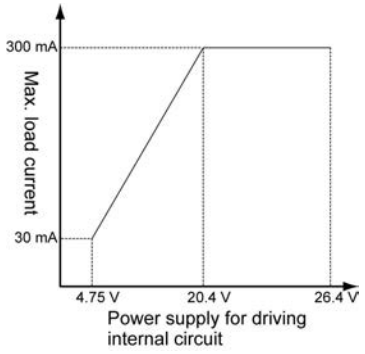
■ Description

Items		AFP7Y64T
Insulation system		Optical coupler
Output type		Open collector
Rated load voltage		5 to 24 V DC
Allowable load voltage range		4.75 to 26.4 V DC
Max. load current	0.3 A specifications (Y0 to 7)	0.3 A (20.4 to 26.4 V DC) and 30 mA (4.75 V DC)
	0.1 A specifications (other than the above)	0.1 A (20.4 to 26.4 V DC) and 15 mA (4.75 V DC)
Common limits		3.2 A/common
Max. inrush current		0.6 A
OFF state leakage current		1 μA or less
ON state max. voltage drop		0.5 V or less
Response time	OFF→ON	0.1 ms or less (Load current: 2 mA or more)
	ON→OFF	0.3 ms or less (Load current: 2 mA or more)
External power supply	Voltage	4.75 to 26.4 V DC
	Current	70 mA/common (at 24 V)
Surge absorber		Zener diode
Short-circuit protection		None
Input points per common		32 points/1 common
Operating mode indicator		32-point LED indicator (Lit in ON state, switchable)
External connection method		Connector connections (40P x 2, conforming to MIL standards)
Weight (unit)		Approx. 115 g

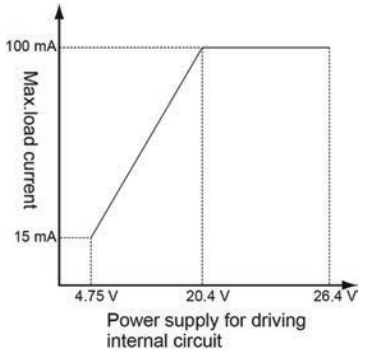
■ Restriction on load current

Refer to the following figure and reduce the load current according to the external power supply voltage.

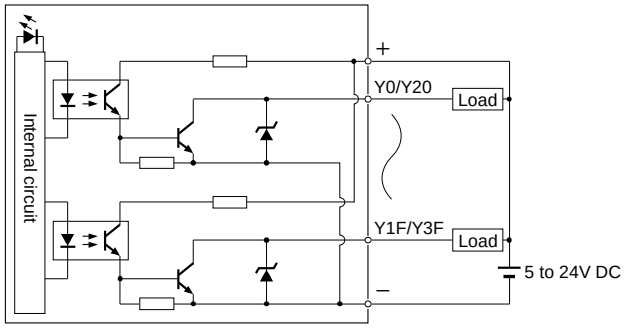
- 0.3 A specifications (Y0 to Y7)



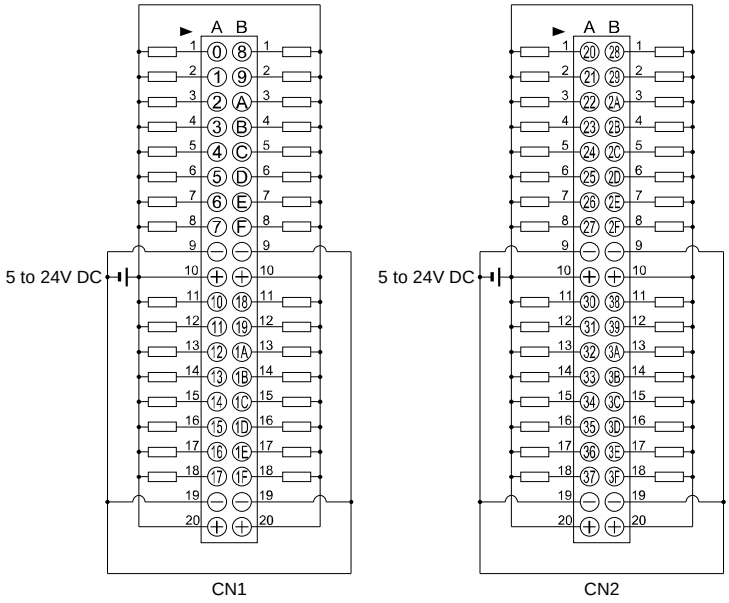
- 0.1 A specifications (other than Y0 to Y7)



■ Internal circuit diagram



■ Terminal layout



Although the positive and negative terminals are connected internally, connect these terminals externally as well.

2.3.7 64-point Source-type Transistor Output Unit

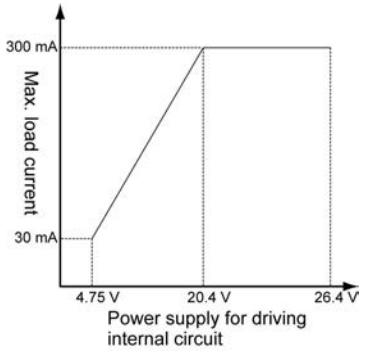
■ Description

Items		AFP7Y64P
Insulation system		Optical coupler
Output type		Open collector
Rated load voltage		5 to 24 V DC
Allowable load voltage range		4.75 to 26.4 V DC
Max. load current	0.3 A specifications (Y0 to 7)	0.3 A (20.4 to 26.4 V DC) and 30 mA (4.75 V DC)
	0.1 A specifications (other than the above)	0.1 A (20.4 to 26.4 V DC) and 15 mA (4.75 V DC)
Common limits		3.2 A/common
Max. inrush current		0.6 A
OFF state leakage current		1 μA or less
ON state max. voltage drop		0.5 V or less
Response time	OFF→ON	0.1 ms or less (Load current: 2 mA or more)
	ON→OFF	0.5 ms or less (Load current: 2 mA or more)
External power supply	Voltage	4.75 to 26.4 V DC
	Current	90 mA/common (at 24 V)
Surge absorber		Zener diode
Short-circuit protection		None
Input points per common		32 points/1 common
Operating mode indicator		32-point LED indicator (Lit in ON state, switchable)
External connection method		Connector connections (40P x 2, conforming to MIL standards)
Weight (unit)		Approx. 115 g

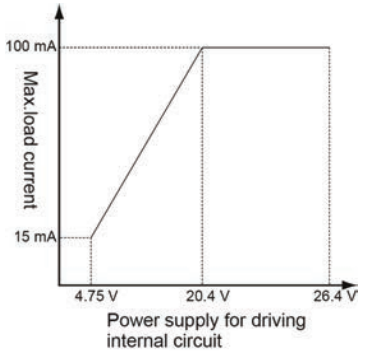
■ Restriction on load current

Refer to the following figure and reduce the load current according to the external power supply voltage.

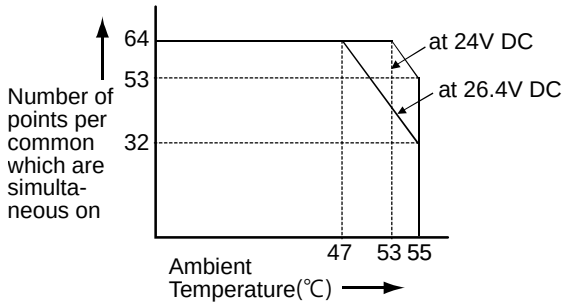
- 0.3 A specifications (Y0 to Y7)



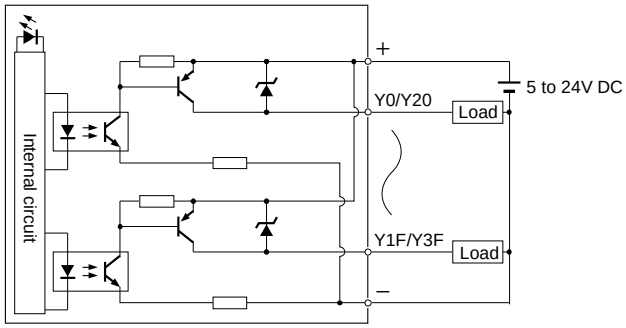
- 0.1 A specifications (other than Y0 to Y7)



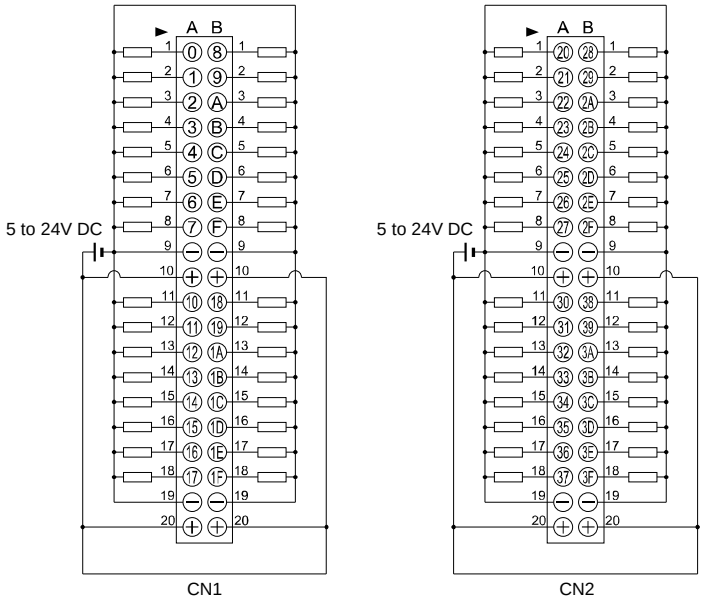
■ Limits on number of simultaneously ON points



■ Internal circuit diagram



■ Terminal layout



Although the positive and negative terminals are connected internally, connect these terminals externally as well.

2.4 I/O Mixed Unit Specifications

2.4.1 32-point DC Input/32-point Sink Type Transistor Output

■ **Description**

Items			AFP7XY64D2T
Input specifications	Insulation system		Optical coupler
	Rated input voltage		24 V DC
	Rated input current		Approx. 2.7 mA (at 24 V DC)
	Input impedance		Approx. 8.2kΩ
	Operating voltage range		20.4 to 26.4 V DC
	Min. ON voltage/Min. ON current		19.2 V/2.5 mA
	Max. OFF voltage/Max. OFF current		5 V/1.5 mA
	Response time	OFF→ON	0.2 ms or less (changeable with time constant switching function at time of input)
		ON→OFF	0.2 ms or less (changeable with time constant switching function at time of input)
	Input points per common		32 points/1 common
Output specifications	Insulation system		Optical coupler
	Output type		Open collector
	Rated load voltage		5 to 24 V DC
	Allowable load voltage range		4.75 to 26.4 V DC
	Max. load current	0.3 A specifications (Y0 to 7)	0.3 A (20.4 to 26.4 V DC) and 30 mA (4.75 V DC)
		0.1 A specifications (other than the above)	0.1 A (20.4 to 26.4 V DC) and 15 mA (4.75 V DC)
	Common limits		3.2 A/common
	Max. inrush current		0.6 A
	OFF state leakage current		1 μA or less
	ON state max. voltage drop		0.5 V or less
	Response time	OFF→ON	0.1 ms or less (Load current: 2 mA or more)
		ON→OFF	0.3 ms or less (Load current: 2 mA or more)
	External power supply	Voltage	4.75 to 26.4 V DC
		Current	70 mA (at 24 V)
	Surge absorber		Zener diode
	Short-circuit protection		None
	Input points per common		32 points/1 common
Operating mode indicator			32-point LED indicator (lit in ON state)
External connection method			Connector connections (40P conforming to MIL standards)
Weight (unit)			Approx. 115 g

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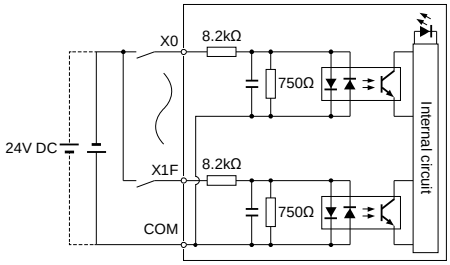
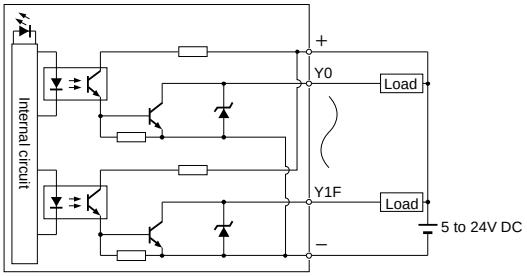
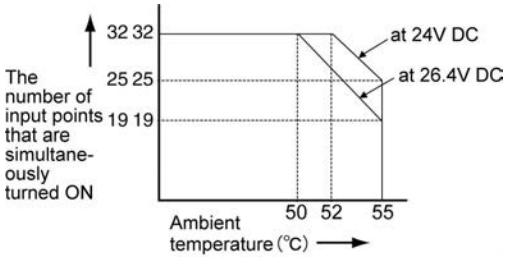
■ Internal circuit diagram





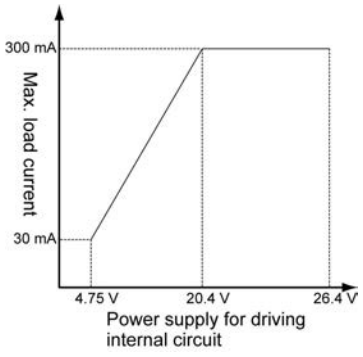
■ Limits on number of simultaneously ON points (common to input/output)



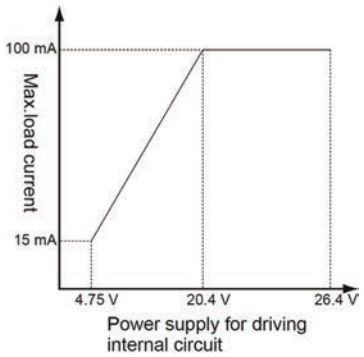
■ Restriction on load current

Refer to the following figure and reduce the load current according to the external power supply voltage.

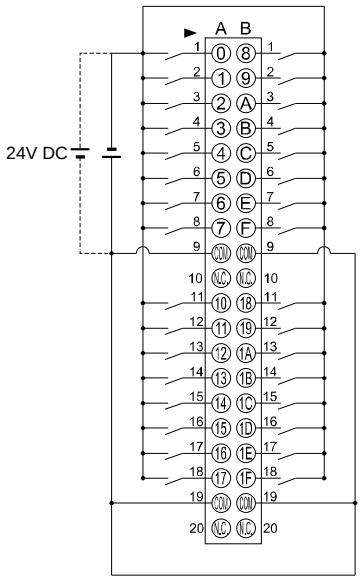
- 0.3 A specifications (Y0 to Y7)



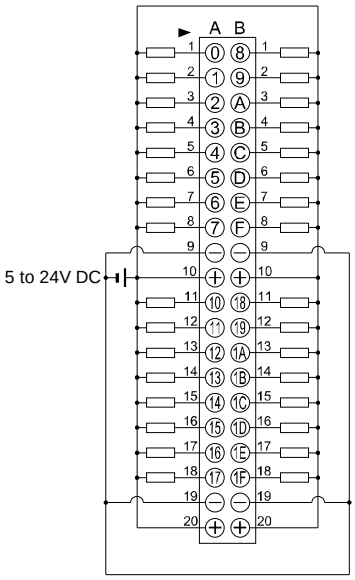
- 0.1 A specifications (other than Y0 to Y7)



■ Terminal layout



The COM terminals are connected internally.



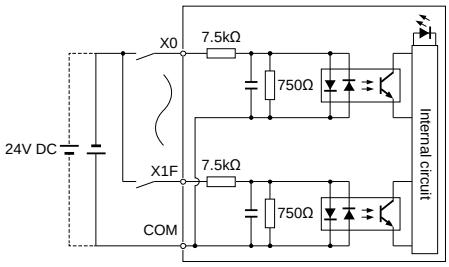
Although the positive and negative terminals are connected internally, connect these terminals externally as well.

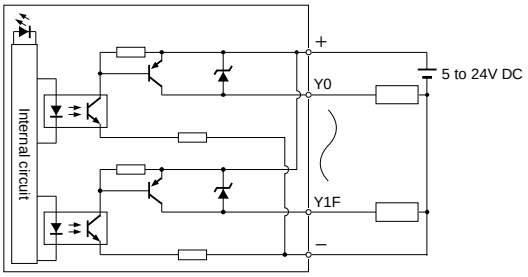
2.4.2 32-point DC Input/32-point Source Type Transistor Output

■ **Description**

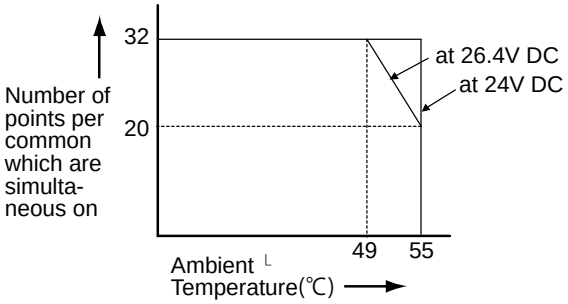
Items			AFP7XY64D2P
Input specifications	Insulation system		Optical coupler
	Rated input voltage		24 V DC
	Rated input current		Approx. 3.4 mA (at 24 V DC)
	Input impedance		Approx. 7.5kΩ
	Operating voltage range		20.4 to 26.4 V DC
	Min. ON voltage/Min. ON current		19.2 V/2.5 mA
	Max. OFF voltage/Max. OFF current		5 V/1.5 mA
	Response time	OFF→ON	0.2 ms or less (changeable with time constant switching function at time of input)
		ON→OFF	0.2 ms or less (changeable with time constant switching function at time of input)
	Input points per common		32 points/1 common
Output specifications	Insulation system		Optical coupler
	Output type		Open collector
	Rated load voltage		5 to 24 V DC
	Allowable load voltage range		4.75 to 26.4 V DC
	Max. load current	0.3 A specifications (Y0 to 7)	0.3 A (20.4 to 26.4 V DC) and 30 mA (4.75 V DC)
		0.1 A specifications (other than the above)	0.1 A (20.4 to 26.4 V DC) and 15 mA (4.75 V DC)
	Common limits		3.2 A/common
	Max. inrush current		0.6 A
	OFF state leakage current		1 μA or less
	ON state max. voltage drop		0.5 V or less
	Response time	OFF→ON	0.1 ms or less (Load current: 2 mA or more)
		ON→OFF	0.5 ms or less (Load current: 2 mA or more)
	External power supply	Voltage	4.75 to 26.4 V DC
		Current	90 mA/common (at 24 V)
	Surge absorber		Zener diode
	Short-circuit protection		None
	Input points per common		32 points/1 common
Operating mode indicator			32-point LED indicator (Lit in ON state, switchable)
External connection method			Connector connections (40P x 2, conforming to MIL standards)
Weight (unit)			Approx. 115 g

■ Internal circuit diagram





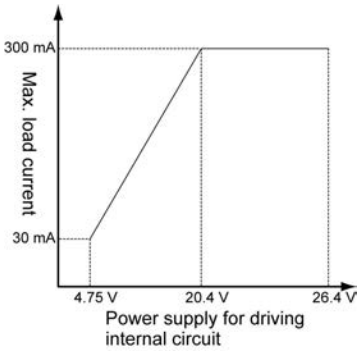
■ Limits on number of simultaneously ON points (common to input/output)



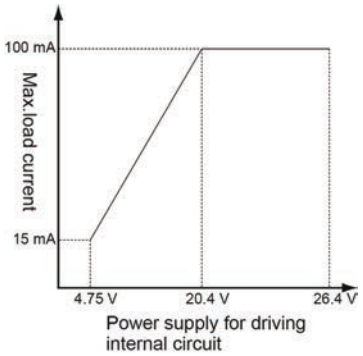
■ Restriction on load current

Refer to the following figure and reduce the load current according to the external power supply voltage.

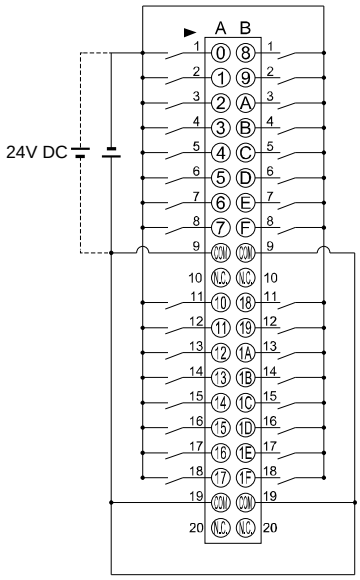
- 0.3 A specifications (Y0 to Y7)



- 0.1 A specifications (other than Y0 to Y7)

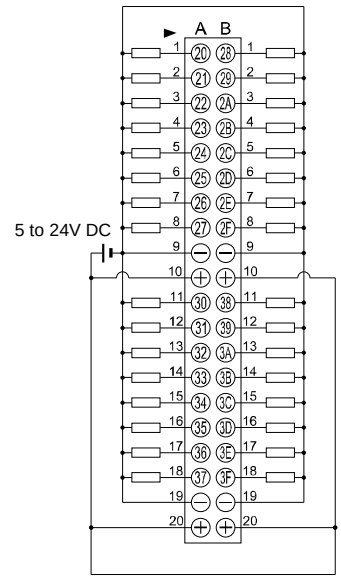


■ Terminal layout



CN1

The COM terminals are connected internally.



CN2

Although the positive and negative terminals are connected internally, connect these terminals externally as well.

2.5 Input Time Constant Switching Function

2.5.1 Overview of Function

Software tools can change the input time constant.
Select the set time from
None/0.1/0.5/1.0/5.0/10.0/20.0/70.0/[ms]
and set the selected set time on a unit-by-unit basis.

The set constant is added to the response time specific to the hardware of each unit.

Example) 16-point Input Unit
Specific response time OFF→ON: 0.1 ms, ON→OFF: 0.2 ms
If “1.0 ms” is set for this unit, the following overall response periods will result.
Response time after setting OFF→ON: 1.1 ms, ON→OFF: 1.2 ms

The time constant to be set has a margin of error, which should be kept in mind when selecting the set value. The accuracy of each time constant is shown in the table below.

Time constant / Setting	Min.	Max.
No time constant settings	—	—
0.1 ms	0.1 ms	0.2 ms
0.5 ms	0.3 ms	0.7 ms
1 ms	0.7 ms	1.3 ms
5 ms	3.0 ms	5.2 ms
10 ms	6.0 ms	10.4 ms
20 ms	12.1 ms	20.7 ms
70 ms	48.6 ms	82.8 ms

2.5.2 Setting by FPWIN7 Software Tool

The input time constant can be set in the I/O map of the FPWIN GR7 configuration menu.

◆ **PROCEDURE**

1. **Select “Options" → "FP7 Configuration" from the menu bar.**

   The FP7 Configuration dialog box is displayed.

2. **Select "I/O Map."**

3. **Double-click the "Operating Unit" in the target slot.**

   The Select Unit dialog box is displayed.

4. **Select the target Digital I/O Unit and input time constant, and press the [OK] button.**

   The information set is registered with the I/O map.

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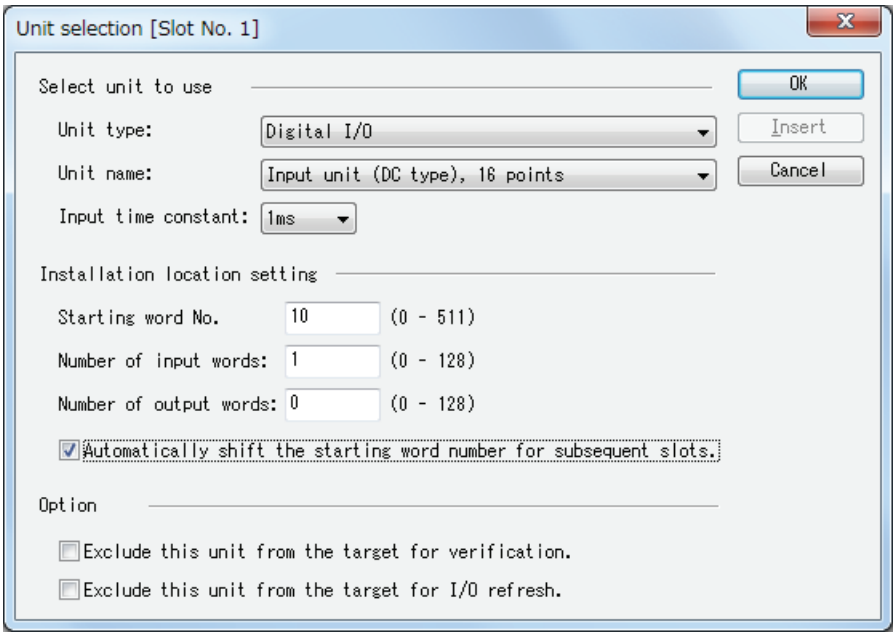

Unit selection [Slot No. 1]
Select unit to use
OK
Unit type:
Digital I/O
Insert
Unit name:
Input unit (DC type), 16 points
Cancel
Input time constant:
1ms
Installation location setting
Starting word No.
10
(0 - 511)
Number of input words:
1
(0 - 128)
Number of output words:
0
(0 - 128)
Automatically shift the starting word number for subsequent slots.
Option
Exclude this unit from the target for verification.
Exclude this unit from the target for I/O refresh.

3
Wiring

3.1 Precautions on Wiring

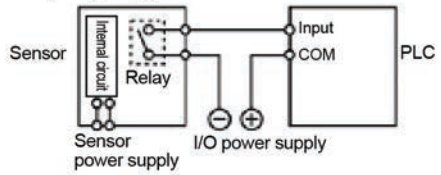
3.1.1 Before Wiring

- Before the wiring, carefully confirm the specifications of the unit to be wired.
- Each unit varies in ambient temperature, the number of simultaneously ON points, and supply voltage limitations.

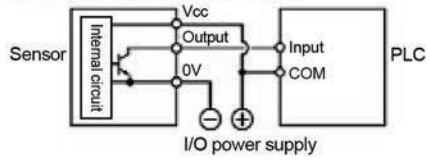
3.1.2 Precautions on Input Wiring

Connection of photoelectric sensor and proximity sensor

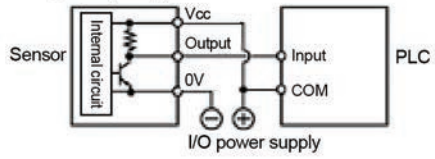
Relay output type



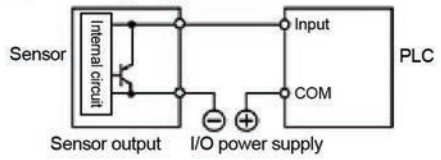
NPN open collector output type



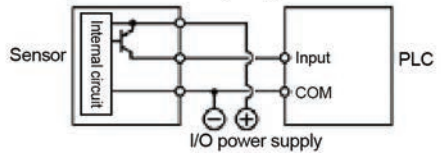
Voltage output type



Two-wire output type



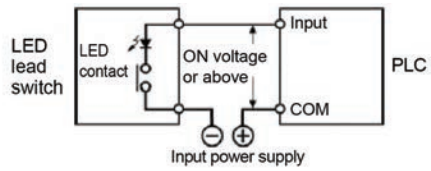
PNP open collector output type



Connection of LED-equipped reed switch

With a LED is connected to an input contact such as LED-equipped reed switch, make sure that the voltage value applied to the input terminal of PLC is greater than on voltage value.

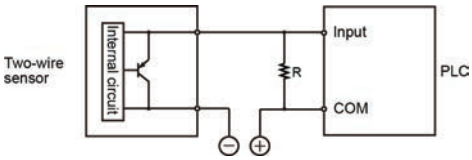
In particular, take care when connecting a number of switches in series.



Connection of two-wire type sensor

If the input of the PLC is not turned off because of leakage current from the two-wire type sensor, the connection of a bleeder resistor is recommended, as shown below.

Using 16-point type input unit (AFP7X16DW)
(Off voltage: 2.5 V; input impedance: 3.6kΩ)



I: Sensor's leakage current (mA)
R: Bleeder resistor (kΩ)

The off voltage of the input is 2.5 V. Therefore, select an R so that the voltage between the COM terminal and the input terminal will be less than 2.5 V.
The input impedance is 3.6kΩ.

$$I \times \frac{3.6R}{3.6+R} \leq 2.5. \text{ Therefore, } R \leq \frac{9}{3.6I-2.5} \ (k\Omega)$$

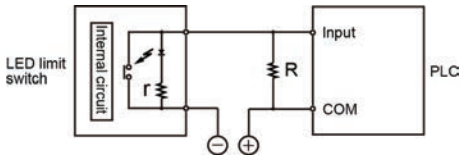
The wattage W of the resistor is: $W = \frac{(\text{Power supply voltage})^2}{R}$

In the actual selection, use a value that is 3 to 5 times the value of W.

Connection of LED-equipped limit switch

With the LED-equipped limit switch, if the input of the PLC is not turned off or if the LED of the limit switch is kept on because of the leakage current, the connection of a bleeder resistor is recommended, as shown below.

Using 16-point type input unit (AFP7X16DW)
(Off voltage: 2.5 V; input impedance: 3.6kΩ)



r: Internal resistor of limit switch (kΩ)
R: Bleeder resistor (kΩ)

The input off voltage is 2.5 V. Therefore, when the power supply voltage is 2.4 V, the input impedance is 3.6kΩ.

$$I \times \frac{2.4\text{-}2.5}{r} \text{ or more}$$

Obtain R so that the above current will flow. Obtain I in the same way as when using the above 2-wire sensor.

$$R \leq \frac{9}{3.6I\text{-}2.5}\ (k\Omega) \quad W = \frac{(\text{Power supply voltage})^2}{R} \times (3 \text{ to } 5)$$

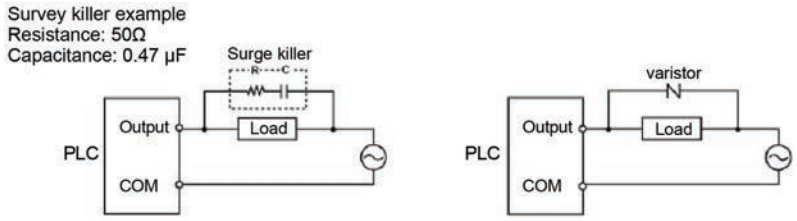
3.1.3 Precautions on Output Wiring

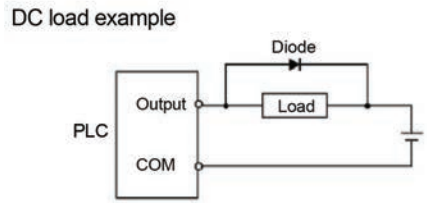
■ **Connection of inductive loads**

When connecting an inductive load, a protective circuit should be installed in parallel with the load.

When connecting the DC type inductive loads and relay type output unit, be sure to connect a diode for protective circuit across the ends of the load. This will affect the life of the relay.

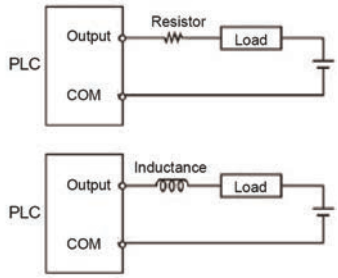
When using an AC inductive load (Relay output type)





■ **Connection of capacitive loads**

When connecting the loads with large in-rush currents, be sure to connect a protection circuit in series with the load.



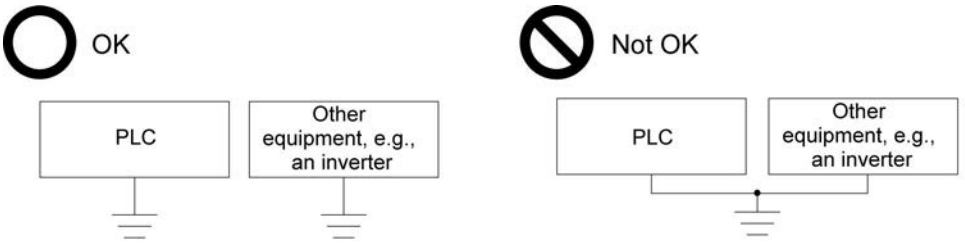
■ **Precautions for overload**

To protect the units from overloading, it is recommended to attach an external fuse for each point.

There are times that the elements for the output units cannot be protected even if external fuses are connected.

■ Earth

- In order to avoid the effects of noise, be sure to ground the AFP7Y16R terminal.
- The grounding connection should have a resistance not in excess of 100Ω.
- The point of grounding should be as close to the PLC as possible. The ground wire should be as short as possible.
- Sharing the ground with another device may have an adverse effect. Therefore, be sure that grounding is dedicated.



Notes:

Sharing the ground with another device may have an adverse effect. Therefore, be sure that grounding is dedicated.

3.2 Wiring I/O Unit of Terminal Block Type

3.2.1 Suitable Wires and Solderless Terminals

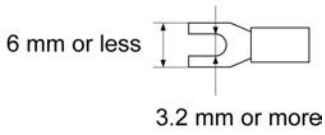
■ **Suitable wires**

Suitable wires	Tightening torque
AWG22 to 14 (0.3 mm^2 to 2.0 mm^2)	0.5 to 0.6 N·m

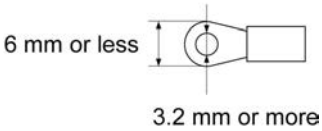
Solderless terminal

M3 terminal screws are used for the terminal. The following suitable solderless terminals are recommended for the wiring to the terminals.

●Fork type terminal



●Round type terminal



■ **Suitable solderless terminal**

Manufacturer	Shape	Part No.	Suitable wires
J.S.T. Mfg Co., Ltd.	Fork type	1.25-B3A	0.25 to 1.65 mm^2
	Round type	1.25-MS3	
	Fork type	2-N3A	1.04 to 2.63 mm^2
	Round type	2-MS3	

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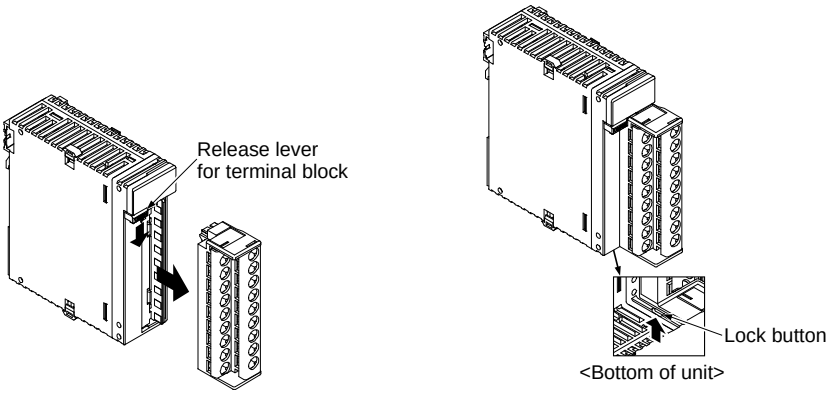
3.2.2 Wiring to Terminal Block

- Remove the terminal block before beginning the wiring operations.
- To remove the terminal block, push downward the release lever located at the top of the terminal block.



Note:
Install the terminal block by inserting it all the way to its original position and pressing the lock button on the bottom of the unit. Then confirm that the terminal block is securely attached and cannot be removed.

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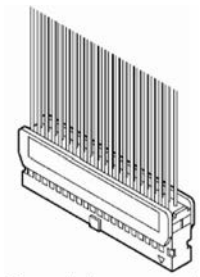
3.3 Wiring Connector-type I/O Unit

3.3.1 Wiring with Connectors for Wire-pressed Terminal Cable

■ **Specifications of connectors for wire-pressed terminal cable**

This is a connector allowing loose wires to be connected without removing the wire's insulation. A dedicated pressure connection tool is required to connect the loose wires.



Strand wire connector (40P)

■ **Suitable wires (strand wire)**

Size	Nominal cross-sectional area	Insulation thickness	Rated current
AWG22	0.3 mm^2	1.5 to 1.1 dia.	3 A
AWG24	0.2 mm^2		

■ **Wiring with connectors for wire-pressed terminal cable (provided with unit)**

Manufacturer	Composition of components	Unit type and required quantity	
		32-point-type Input Unit 32-point-type Output Unit	64-point-type Input Unit 64-point-type Output Unit I/O Mixed Unit
Panasonic-made	Housing (40P)	1 x 1 set	1 x 2 sets
	Semi-cover (40P)	2 x 1 set	2 x 2 sets
	Contact (for AWG22 or 24) 5 pins	8 x 1 set	8 x 2 sets

(Note) The 32-point-type unit is provided with one set and the 64-point-type and I/O mixed units are provided with two sets each. If you need more connectors, purchase AFP2801 (2 sets/pack).

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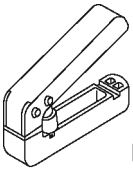
■ **Pressure connection tool**

Manufacturer	Product No.
Panasonic	AXY52000FP



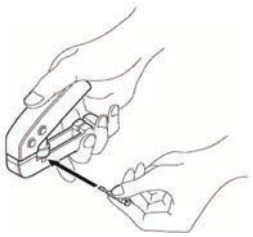
Pressure connection tool

3.3.2 Assembly of Connector for Wire-pressed Terminal Cable

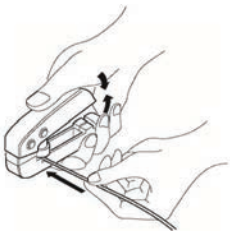
The wire end can be directly crimped without removing the wire's insulation, saving labor.

(Procedure)

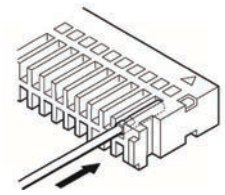
1. Bend the contact back from the carrier, and set it in the pressure connection tool.



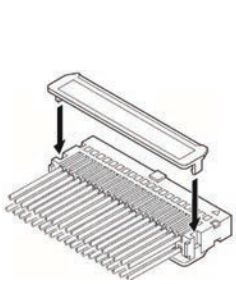
2. Insert the wire without removing its insulation until it stops, and lightly grip the tool.

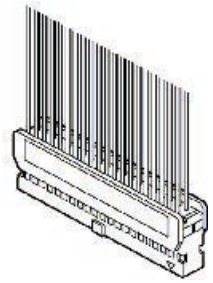


3. After press-fitting the wire, insert it into the housing.



4. When all wires have been inserted, fit the semi-cover into place.

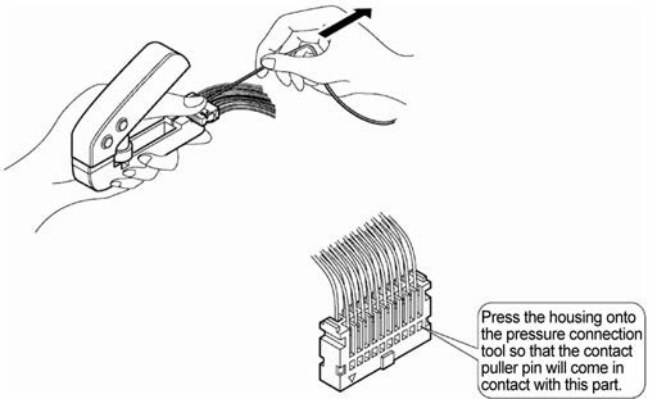




◆ KEY POINTS

Contact puller pin to redo wiring

If there is a wiring mistake or the wire is incorrectly pressure-connected, the contact puller pin provided with the fitting can be used to remove the contact.



3.3.3 Wiring with Flat Cable Connectors

Wiring with flat cable connectors

When connecting with a flat cable connector, the relationship between the cable number and I/O number is shown below.

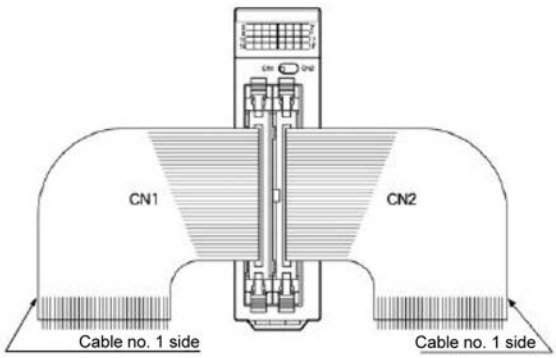
Correspondence table of flat cable No. and I/O No. CN1 group

Cable No.	Input No.	Output No.	Cable No.	Input No.	Output No.
1	X0	Y0	21	X10	Y10
2	X8	Y8	22	X18	Y18
3	X1	Y1	23	X11	Y11
4	X9	Y9	24	X19	Y19
5	X2	Y2	25	X12	Y12
6	XA	Y6	26	X1A	Y1A
7	X3	Y3	27	X13	Y13
8	XB	YB	28	X1B	Y1B
9	X4	Y4	29	X14	Y14
10	XC	YC	30	X1C	Y1C
11	X5	Y5	31	X15	Y15
12	XD	YD	32	X1D	Y1D
13	X6	Y6	33	X16	Y16
14	XE	YE	34	X1E	Y1E
15	X7	Y7	35	X17	Y17
16	XF	YF	36	X1F	Y1F
17	COM	-	37	COM	-
18	COM	-	38	COM	-
19	NC	+	39	NC	+
20	NC	+	40	NC	+

Correspondence table of flat cable No. and I/O No. CN2 group

Cable No.	Input No.	Output No.	Cable No.	Input No.	Output No.
1	X20	Y20	21	X30	Y30
2	X28	Y28	22	X38	Y38
3	X21	Y21	23	X31	Y31
4	X29	Y29	24	X39	Y39
5	X22	Y22	25	X32	Y32
6	X2A	Y2A	26	X3A	Y3A
7	X23	Y23	27	X33	Y33
8	X2B	Y2B	28	X3B	Y3B
9	X24	Y24	29	X34	Y34
10	X2C	Y2C	30	X3C	Y3C
11	X25	Y25	31	X35	Y35
12	X2D	Y2D	32	X3D	Y3D
13	X26	Y26	33	X36	Y36
14	X2E	Y2E	34	X3E	Y3E
15	X27	Y27	35	X37	Y37
16	X2F	Y2F	36	X3F	Y3F
17	COM	-	37	COM	-
18	COM	-	38	COM	-
19	NC	+	39	NC	+
20	NC	+	40	NC	+

Flat-cable connection diagram for 64-point-type input unit, 64-point-type output unit, I/O mixed unit



Suitable wires (strand wire)

Size	Pitch	Rated current
AWG28 (7 wires/0.127 dia.)	1.27 mm	1 A

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Record of changes

Manual No.	Date	Record of Changes
WUME-FP7DIO-01	Mar.2013	First Edition
WUME-FP7DIO-02	Oct.2013	Second Edition